NEW COMBINATION SOLUTION FOR RS POSITIONS RSC(GAOU UA)05 C 03

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ABSTRACT. Main Astronomical Observatory of the NAS of Ukraine is involved in the work of a redetermination of the ICRF, that was initiated by the IVS. We have carried out several combination runs based on individual catalogues provided by 8 IVS Analysis Centers and have selected the final version RSC(GAO UA)05 C 03. In comparison with the ICRF and other combined catalogues, orientation parameters and uncertainty of this new combined catalogue are given.

1. INITIAL CATALOGUES OF RS POSITIONS

In 2004 the IVS began a program to redeterminate the ICRF. The first step in February 2005 was the generation of RS catalogues in a configuration similar to the 1995 ICRF analysis. There are currently 8 initial catalogues provided by the IVS Analysis Centers (see Fig.1).

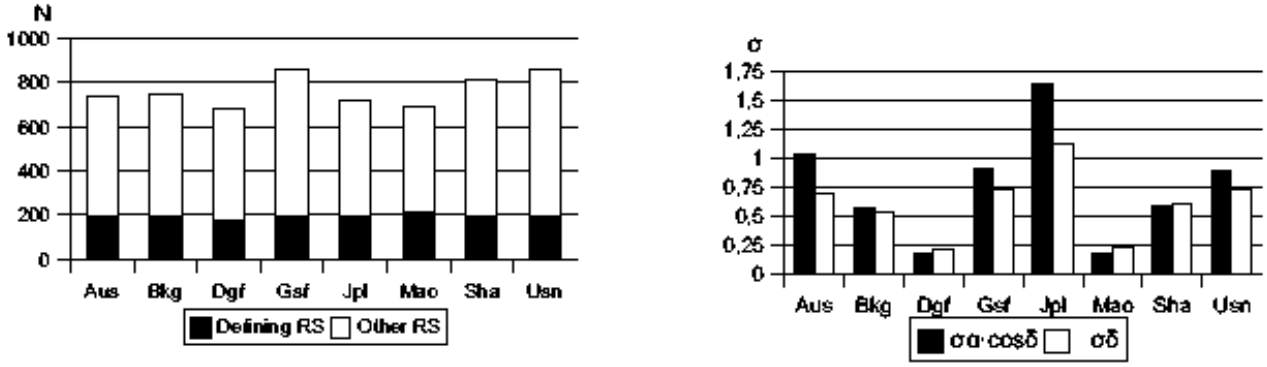

Figure 1: Number of RS (left side) and internal uncertainties (right side) for initial catalogues

2. NEW VERSION OF THE COMBINED CATALOGUE RSC(GAO UA)05 C 03

The Kyiv arc length method proposed by Y.Yatskiv and A. Kur'yanova, 1990 was used for construction of new combined catalogue. For this purpose several runs of combination solution based on initial catalogues mentioned above have been conducted and the catalogue RSC(GAO UA)05 C 03 has been selected as a final solution (see Lytvyn S., 2006).

This catalogue contains the positions of 953 RS, including 212 defining sources. The average values of positional uncertainties of defining RS are about 0,03 and 0,04 mas for RA and DEC respectively. The relative orientation and deformation parameters between the catalogue and the ICRF-Ext.1 are the following (in μas)

$$A_1 = -1 \pm 27 \quad A_2 = 2 \pm 27 \quad A_3 = -21 \pm 32.$$
$$D_\alpha = -2 \pm 1 \quad D_\delta = 0 \pm 1 \quad B_\delta = 12 \pm 24.$$

To check the quality of the RSC (GAO UA) 05 C 03 we have compared it with the ICRF-Ext.1 and the RSC(GAO UA)03 C 02 (see Yatskiv, Bolotin and Kur'yanova, 2004).

In Table 1 r.m.s. differences d_{ij}, coefficients of correlation r_{ij} between the frames, and estimated "external" uncertainties σ_i of the ICRF(σ_1), RSC(GAO UA)O3 C O2(σ_2) and the RSC(GAO UA)05 C 03(σ_3) are given.

	r.m.s.differences d_{ij}, mas			correlations r_{ij}			uncertainties, mas, on condition $r_{ij} \neq 0$		
	d_{12}	d_{13}	d_{23}	r_{12}	r_{13}	r_{23}	σ_1	σ_2	σ_3
All 584 common RS									
RA	0.54	0.44	0.39	-0.74	-0.45	-0.26	0.30	0.28	0.21
Decl	0.62	0.42	0.55	-0.73	-0.15	-0.56	0.31	0.36	0.25
211 common defining RS									
RA	0.32	0.35	0.26	-0.56	-0.69	-0.22	0.21	0.15	0.18
Decl	0.31	0.30	0.30	-0.52	-0.51	-0.47	0.18	0.17	0.17

Table 1: "External" estimations of uncertainties of the reference frames. R.M.S. differences d_{ij}, correlations r_{ij}, and uncertainties, σ_i calculated for all and for defining RSs. Indexes are used as follows: 1- ICRF, 2- RSC (GAOUA)03 C 02, 3- RSC(GAOUA)05 C 03

3. CONCLUSION

We have constructed a new combined catalogue which is internally more consistent as compared with other realisations of the ICRF.

REFERENCES

Lytvyn S., 2006. Comparison of various runs of combination solution for constructing the GAOUA combined catalogue of RS positions., Proc. Journees System de Reference Spation-Temporals, 2005. Warsaw(this volume)

Yatskiv Ya., Kur'yanova A. and Bolotin S., 2004. ICRF consistency check by comparison of the ICRF-Ext.1 with the GAOUA series of RS catalogues., Proc. Journees 2003, Astrometry, Geodynamics and Solar SyStem Dynamics: from milliarcseconds to microarcseconds, St. Petersburg (Russia), pp. 39-46.

Yatskiv Ya.S., Bolotin S.L., Kur'yanova A.N., 2004. GAOUA - realizations of celestial reference frame, Kinenatics and Phisics of Celestial Bodies, Vol. 20, No 4, pp. 291-299.